# APPLICATION FOR MEMBERSHIP IN NOνA

**Ervin J. Fenyves**

Professor of Physics

*University of Texas at Dallas*

# University of Texas at Dallas

Since its inception in 1961 as the Graduate Research Center of the Southwest, an outgrowth of technology giant Texas Instruments, UTD fosters a strong tradition of academic excellence. UTD became part of the U. T. System in 1969, offered only graduate degrees until 1975, and admitted its first freshman class in 1990. Today, it ranks at or near the top in the number of computer science degrees awarded each year in the United States.

# UT Dallas Team

- Dr. Fenyves would like, on behalf of the UTD High Energy Particle Physics Group, to apply for membership in the NovA Collaboration and take part in the research and development works.

- The UTD NovA group consists of :

  3 professors : Ervin Fenyves, Austin Cunningham, Andras Farago
  2 graduate students : Robert Burkart, Donnie Bridgefarmer
  and 4 undergraduate students.

# The UTD team's proposal for work within the NOvA Collaboration is:

1. To carry out cosmic ray background simulation studies of overburden requirements for the Far Detector using Monte Carlo simulations of the muon, electron-photon and hadron component attenuation in 1-5m overburden.

2. After the cosmic ray studies repeat the Monte Carlo simulations for predicting the neutrino beam spectra at the Near and Far Detector using the new improved results of the Fermilab E907 MIPP experiment on input particle production.

# The UTD team's proposal for work within the NOvA Collaboration is:

3. Additional Monte Carlo simulations as become necessary in further development of the NOvA project. Professor Farago is assisting in the simulation work to help the students with programming or operational problems.

4. After June 2006 we plan to participate in the WLS fiber R&D, quality measurements of the Kuraray and other fibers, and cost optimization of the fiber system. It is this work area that is suited to the capabilities of Professor Cunningham.

# The UTD team's proposal for work within the NOvA Collaboration is:

- UTD would like to form close collaborations with other NovA member institutions interested in the same or related fields, remaining flexible in further studies according to NovA program needs. We expect for our student collaborators that this program will provide a well defined learning experience, as well as ultimately a useful initiative for NovA. Additional students may be brought into the program as the needs arise, remaining flexible as to the needs of NovA.

# Preparation

We have already proceeded with having the undergraduate students download, install, and begin operating and learning the Geant 4 Simulation Took Kit. They have successfully completed this first step of the process. They have been assigned the task of implementing a detector and overburden design in the software for the NovA far detector, insert the required elementary particles and physics processes, and program an appropriate input for cosmic ray muons as a beginning, relatively simple study. The next undertaking for them will be to enhance their tool kit with both analysis and presentation software so that they can properly present their results.

# Ervin Fenyves

received his Ph.D. in Physics from the Eotvos Lorand University in Budapest. He began his research activities in 1946 with experimental studies in cosmic ray physics and related experimental technique. His major contribution to the field was his simulation of the electromagnetic component of the 100 TEV to 10,000 TEV cosmic ray air showers.

His later interest turned to high energy and elementary particle physics carried out with accelerators, and within the last three decades became involved in neutrino physics, including solar and extra-solar neutrinos. He is presently the UTD institutional representative in the CMS Detector project of the LHC.

His major contribution in the high energy and particle physics field was in the development of new detector technologies, where he published three books and over half of his 204 publications.

For some twenty years he has been working in close collaboration with Professor David Cline of UCLA on the OMNIS and LANNDD projects. He is a Fellow of the American Physical Society, Honorary Member of the Eotvos Lorand Physical Society, and a member of the Hungarian Academy of Sciences.

# Austin Cunningham

Professor of Physics and Dean of Graduate Studies at the University of Texas at Dallas.

He studies collisional processes in planetary atmospheres, gas laser operation, thin film plasma deposition, and determining the output of high intensity lamps.

He is motivated by a better understanding of the collisional and radiative pathways governing energy production, transfer, and loss in different plasma environments.

Professor Cunningham received his B.S. and Ph. D. in Physics from the Queens University in Northern Ireland.

# Andras Farago

Professor of Computer Science at the University of Texas in Dallas.

Prior to coming to UT Dallas he was at the Technical University of Budapest from 1977 until 1997, where his work involved the theory of communications, signal and speech processing, telecommunication systems and networks, the study of algorithms and complexity in computer systems.

His main area of interest at UTD is in design and analysis methods of communication networks and protocols.

# Robert F. Burkart

received his physics education at the University of Texas at Dallas where he has been a collaborator with Professor Fenyves on several projects.

He is experienced in neutrino physics and has performed simulation studies on projects such as OMNIS using the Geant 4 simulation program.

He has worked with Dr. Fenyves and Dr. Cline on studies of neutrino detectors for neutrino factories, neutron detectors for experimental and anti-terrorism purposes, and on OMNIS and LANNDD.

# Time Commitment

Professors

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|---|---|
| E. Fenyves | ~1/3 time |
| A. Cunningham | ~1/3 time |
| A. Farago | ~1/3 time |